STABILIZER SUPPORT SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit, under 35 U.S.C. §119, of provisional U.S. Application Serial No. 60/456,962, filed 25 March 2003, the entire contents and substance of which is hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to a stabilizer support system and a method for stabilizing or supporting heavy equipment in general. The system may comprise a support structure such as a conventional A-frame that is configured to support a crane or heavy equipment. The system and method are designed to provide an adapter to support the structure by distributing weight and load onto, for example, a rail or similar transportation system while still allowing movement of the structure along the rails or other transportation system.

BACKGROUND OF THE INVENTION

[0003] In industries, such as the railroad, for example, transporting machinery, supplies, and crews to limited access areas has been extremely difficult. Historically, there have generally been two methods for handling materials used for the railroad industry, such as rails, ties, other track material ("OTM") and ballast in order to bring it to limited access areas. Some examples of OTM are spikes, tie plates, rail anchors, and bolts. The first transport method has been by rail car. This method requires a great deal of coordination and can result in major delays due to the availability of cars, engines and/or locomotives. Even under optimum conditions, this method is only cost-effective if a large number of cars and/or materials are needed at the same time in approximately the same location.

[0004] The second method of transporting machinery, supplies, and crews to limited access areas has been by stockpiling at the nearest road location and reloading onto specialized hy-rail trucks or transporting with a front-end loader. This option is more commonly used, yet requires an available stockpiling area and/or double loading of the material. This method also requires extra equipment for the second loading and ties up specialized equipment.

[0005] Additionally, moving heavy materials requires extra support to prevent the loading vehicle or railway car from tipping during the loading process. To prevent such tipping, A-frame apparatus with support legs have been attached to the loading vehicle or railcar. The support legs are released in a downward direction and planted firmly on a ground surface to absorb the load force. Unfortunately this process takes a substantial amount of time because the support legs need to be resituated each time the loading vehicle or railcar is moved. Specifically, any time that the loading or carrier vehicle or car is moved, the support legs must be drawn up into the A-frame and then re-deployed when the loading or carrier vehicle or rail car are repositioned.

SUMMARY OF THE INVENTION

[0006] One embodiment of the present invention includes, for example, a railway support stabilizer system with a support frame and fit sleeves that are adapted to receive support legs. In one particular embodiment, the support frame is an A-frame. In another embodiment of the present invention, the support legs extend from a support frame. In an alternative embodiment, the support frame may be attached to any appropriate system, such as, for example, a railcar or a truck. In still another embodiment of the present invention, the invention is detachable.

[0007] In another embodiment of the present invention, the fit sleeves have a locking mechanism, which may include a bar channel, a bar tool, a pin, and/or one or more apertures. In one embodiment of the present invention, the fit sleeves are adapted to be attached to a load beam. In another embodiment, the load beam is supported by wheels. The wheels may, for example, be adapted for railway use or use on roadways or other flat surfaces, or surfaces of varying configurations. One embodiment of the present invention includes support legs with a flanged lower end. In this embodiment, the flange is adapted to slide into the fit sleeves. In another embodiment, a set of wheels may be attached beneath the fit sleeves to the load beam. In one embodiment, the wheels are rubber tires. In another embodiment, the invention includes tracks with or without treads, instead of tires. In one embodiment, the system includes hydraulics for added stabilization and to provide for further balance or a guard against overload conditions. In still another embodiment, the support legs may have wheels, tires, or rollers at their ends to facilitate movement on a surface.

[0008] One embodiment of the present invention includes a method for stabilizing a support system that includes providing a load beam with fit sleeves and extending support

legs to rest on the load beam. Another embodiment of the present invention includes a method for stabilizing a support system that includes attaching a load beam with fit sleeves to a support structure, rotating the load beam upward, extending the support legs, sliding the fit sleeves under the support legs and locking the fit sleeves to the support legs. In this method the fit sleeves may be rotated upwards to receive the support legs, which may be extended to rest just above the fit sleeves. In another embodiment, a channel in the fit sleeves may slide along the support leg flange. Another embodiment of the present invention may include a method for distributing the weight on a support system by providing a load beam with fit sleeves and extending support legs to rest upon this structure. In this embodiment, a lift mechanism such as a channel and a channel tool may be used to properly orient the fit sleeves.

[0009] These and other features of the invention may be more fully understood by reference to the following drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Figure 1 depicts a view of a typical railway support system with the support structure in the storage position on a hy-rail truck.

[0011] Figure 2 depicts a view of a typical railway support system attached to an articulating boom.

[0012] Figure 3 depicts one embodiment of the present invention that is detached from a vehicle or railcar.

[0013] Figure 4 depicts a rear angled view of an embodiment of the present invention.

[0014] Figure 5 depicts a rear view of an embodiment of the present invention.

[0015] Figure 6 depicts a rear view of an embodiment of the present invention in which the adapter is placed on the rails before it is attached to the support system.

[0016] Figure 7 depicts a rear view of an embodiment of the present invention showing positioning of the adapter in relation to the support system in which adapter fit sleeves are turned upward to receive the support legs.

[0017] Figure 8 depicts an embodiment of the present invention showing the support legs extended to connect with the adapter fit sleeves.

[0018] Figure 9 depicts a top view of an embodiment of the present invention in which a pinion is used to lock an adapter fit sleeve into a desired position.

[0019] Figure 10 depicts a close up of a rear view of one embodiment of the present invention in which the rail wheels have rail flanges.

[0020] Figure 11 depicts a close up of an embodiment of the present invention in which a bar and handle configuration is used to lift the adapter in a desired position.

[0021] Figure 12 depicts a close up rear view of an embodiment of the present invention in which a bar and handle configuration is used to lift the load beam into proper position.

[0022] Figure 13A depicts an embodiment of the present invention in which a detachable tire is attached to the adapter.

[0023] Figure 13B depicts a front view close up of a tire configuration used with an embodiment of the present invention with a detachable tire.

[0024] Figure 13C depicts a side view close up of a tire configuration used with an embodiment of the present invention with a detachable tire.

[0025] Figure 14 depicts one embodiment of the present invention in which wheels are attached to the load beam.

DETAILED DESCRIPTION OF THE INVENTION

[0026] It is to be understood that this invention is not limited to the particular methodology, protocols, and construction materials described herein and as such may vary. It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to limit the scope of the present invention, which will be limited only by the appended claims.

[0027] As used herein and in the appended claims, the singular forms "a," "an," and "the" include plural reference unless the context clearly indicates otherwise. Thus, for example, reference to a "sleeve" is a reference to one or more such sleeves and includes equivalents thereof known to those skilled in the art, and so forth.

[0028] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which this invention belongs. Although any methods, devices, and materials similar or equivalent to those described herein can be used in the practice or testing of the invention, the preferred methods, devices and materials are now described.

[0029] Figure 1 depicts a typical system for stabilizing a crane apparatus for lifting. This system utilizes a support structure, such as an A-frame apparatus attached to the rear of

a vehicle, such as a hy-rail vehicle. Support legs are attached to the A-frame apparatus and can be released in a downward direction to help absorb the load and prevent tipping. Figure 2 shows this apparatus in use. As shown, the support legs are deployed and contact the ground to balance the weight of the articulating boom and the material being lifted and/or loaded.

[0030] Figure 3 depicts one embodiment of the present invention. The adapter shown in Figure 3 preferably includes a load beam 60 and fit sleeves 80. This adapter is designed to interact with a support structure. Figure 4 depicts an embodiment in which the adapter interacts with a support structure or frame 10. (partially shown) This frame or support structure 10 (shown fully in Figure 6) may be attached to the rear of a truck, for example. The truck may be a tractor-trailer or tandem truck with rail gear. In another embodiment, support structure 10 may be attached to the front or rear of a railcar. Support legs 20 are adapted to fit inside support structure 10 (shown in Figure 4) and can be released in a downward direction. Support legs 20 are preferably beams of a sufficient length and width to transfer loads without bending or breaking. In one embodiment, support legs 20 preferably have two ends; upper and lower ends 30 and 40, respectively. In a preferred embodiment, as shown, for example, in Figure 9, lower end 40 has a flange 50 about its perimeter. In another embodiment, flange 50 may have one or more apertures for interaction with a locking system 90. In a preferred embodiment of the invention shown in Figure 6, support structure 10 is preferably an A-frame. A preferred type frame is that associated with the Prentice crane loader model 120-C. In other embodiments, the support structure may be of any type adapted to have one or more extendible legs.

[0031] Referring to Figure 5, load beam 60 is also attached, for example, to the rear of a support structure that is preferably attached to a truck or similar vehicle. In another embodiment, load beam 60 may be attached to the rear or front of a railcar. Load beam 60 preferably is supported by a plurality of wheels 70. Wheels 70 may be adapted to ride on rail, track or, in another embodiment, may be adapted to ride on other surfaces such as gravel, asphalt, or any other ground surface. Wheels may be of varying sizes for different loads or types of track. Wheels 70 may also have grooves or flanges of varying sizes to allow movement on various types of terrain, including rails and /or asphalt, for example. Wheels 70 may be made of any material capable of rolling.

[0032] Load beam 60 preferably has a plurality of fit sleeves 80. Fit sleeves 80 may be attached on the top of, the sides of or beneath load beam 60. Figure 10 is a close up of load beam 60 with fit sleeves 80 attached. In this embodiment, fit sleeves 80 are adapted to

slide along load beam 60. In alternative embodiments, fit sleeves 80 may be adapted to rotate about load beam 60.

[0033] Fit sleeves 80 may be flat plates with a plurality of grooves as shown in Figure 10. In alternative embodiments, fit sleeves 80 may be of any shape to contact load beam 60 and support legs 20. Fit sleeves 80 may also have a locking mechanism, such as an aperture, for example, that is used to lock the fit sleeves 80 to support legs 20. In one embodiment, a pin 95 may be inserted through support legs 20 and fit sleeves 80. In another embodiment, other means of securing support legs 20 and fit sleeves 80 may be used, such as a dove-tail configuration.

[0034] Figures 6-8 depict the assembly of the present invention to support structure 10. In Figure 5, load beam 60 has fit sleeves 80 attached before the entire system is attached to support structure 10. In Figure 7, load beam 60 and corresponding fit sleeves 80 are rotated upward so that the upper face 110 (shown in Figure 6) of fit sleeve 80 is facing lower end 40 of support legs 20.

[0035] Figure 8 shows the positioning of fit sleeves 80 in relation to lower end 40 of support legs 20. In this embodiment, fit sleeves 80 are pushed along load beam 60 towards each other. Fit sleeves 80 are preferably moved until they are directly underneath support legs 20. Referring to Figure 9, in one embodiment, fit sleeves 80 preferably have channels 81 and 82 (not shown) on their forward and rear faces 83 and 84 (not shown), respectively. In alternative embodiments, channels 81 and 82 may be located on any face. In another embodiment, mechanical equivalents may be used in place of channels 81 and 82. Channels 81 and 82 are preferably adapted to encase flange 50 for proper positioning. After fit sleeves 80 are positioned, they may be locked into place as shown in Figure 9 with pin 95.

[0036] In one embodiment, such as the embodiment depicted in Figure 9, locking mechanism 90 may comprises a pin 95 and apertures. One aperture is preferably cut or drilled in flange 50 and is of a larger diameter than shaft 96 of pin 95. Another aperture is preferably cut or drilled in fit sleeve 80 and is of a larger diameter than shaft 96 of pin 95. Pin 95 also has a horizontal handle 97 that may be used to grip pin 95. Shaft 96 of pin 95 may be inserted through an aperture in flange 50 and an aperture in fit sleeve 80. In other embodiments, alternative means of locking may be used, such as, for example, a camshaft-type locking system. Such locking systems are preferably designed to prevent support legs from slipping or vibrating out of place under stressors related to load or movement.

[0037] Figure 10 depicts a close up of one side of an embodiment of this invention. Wheels 70 are adapted to be used in conjunction with rail or track. In this embodiment, handle 120 is in place, which may be used for gripping purposes.

[0038] In another embodiment of the present invention, such as the system shown in Figure 11, a lift mechanism may be used. In another embodiment of the present invention, wheels employing rubber tires may be used instead of rail wheels for off-rail uses. The lift mechanism may include a channel 115 connected to a face of each fit sleeve. A channel tool 130, which may be a long metal bar, is used in conjunction with the channel 115. Channel tool 130 is preferably of a shape and diameter that is adapted to fit inside channel 115 to allow lifting of the entire load beam and its associated parts into the proper position. Channel tool 130, for example, may be a long rod with a slide end and a handle end. Figure 12 shows this same embodiment in a functional position.

[0039] In another embodiment of the present invention, such as shown in Figures 13 A-C, a second set of wheels 140 may be used. Second set of wheels 140 is preferably a set of rubber tires with a greater diameter than wheels 70. Second set of wheels 140 may be adapted to roll on unfinished or rough surfaces. Second set of wheels 140 is preferably attached to the adapter of the present invention via a gooseneck configuration 150. For the purposes of this description only one wheel will be described, as the second set of wheels preferably includes two symmetric wheels. The upper portion 160 of gooseneck 150 is attached to the adapter through load beam 60 underneath fit sleeves 80. Load beam 60 may have an aperture through which gooseneck 150 may be inserted. Gooseneck 150 may be affixed to load beam 60 via a nut, bolt, or similar device. Lower portion 170 of gooseneck 150 comprises a horizontal bar 175 with two vertical bars (176, 177) attached to horizontal bar 175 that extend towards a ground surface. In other embodiments, lower portion 170 may be curved. Axel 180 is connected to vertical bars 176 and 177 and fits through each second wheel 140. This configuration is preferably detachable via inverted forks or slots 185 on the ends of vertical bars 176 and 177 that interact with quick release bolts and levers. In an alternative embodiment, axel 180 may be configured to have a shaft with a threaded portion at a first axle end and a head portion fixed to a second axel end. The axel is preferably in rotatable connection with a nut that secures the axel in an inverted fork 185 of vertical bars 176 and 177. The present embodiment is designed such that the entire invention remains operable in situations where rails are inoperable or nonexistent. Second set of wheels 140 allows the entire invention to remain mobile and capable of handling large loads. Wheels

140 may also be adapted to be steerable by means of rotatable connections to gooseneck 150 and/or forks 185 in addition to or instead of rotatable connections to axel 180.

[0040] In another embodiment of the present invention, wheels employing rubber tires may be used instead of rail wheels for off-rail uses. As shown in Figure 14, a set of wheels may be placed at the ends of load beam 60. In this embodiment, the wheels are larger, preferably at least automobile-sized, and designed to provide non-rail support for the entire apparatus and associated vehicle. The wheels may also be designed to closely approximate the position of the deployed support legs and maintain the original load distribution while allowing the invention and associated vehicle or railcar to be mobile. This set of wheels may be attached in a manner similar to gooseneck configuration 150, described earlier, or in a method similar to fit sleeves 80, with the exception that the fit sleeve would preferably face the ground. In another embodiment, such as that shown in Figure 14, the wheels may attach to an axel that extends through load beam 60.

[0041] Alternatively, tracks with or without treads may be used in any of the locations described above instead of rubber tires or rail wheels. Such tire-wheeled, or tracked alternatives of the present invention may be preferable for certain road grading or asphalt operations.

[0042] Additionally, the present invention is preferably adapted to utilize a hydraulic system. The hydraulic system preferably has a check valve or similar device to provide an additional safety, performance, or stability feature. In this embodiment, if a load greater than or equal to a given value is sensed, the support legs will lock rather than allow hydraulics to further compensate for the load, preventing the vehicle or railcar from tipping over, providing less than optimal performance, or becoming less stable. In this embodiment, the hydraulic system is preferably designed to compensate for small variations on a road or rail system.

[0043] All materials used to produce the current invention are preferably rust or corrosion resistant and capable of withstanding heavy loads without bending or breaking. Such materials may include, for example, stainless steel, iron, iron alloys, or other wear resistant alloys.

[0044] The invention may also be used in other fields for stabilizing supports or providing a counter-force for loading. Examples of other fields may include, but are not limited to baggage handling, shipping, and maritime uses.

[0045] It will be apparent to those skilled in the art that various modifications and variations can be made in the support/stabilization system, apparatus and method of the

present invention and its construction without departing from the scope and spirit of the invention. Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only of the present invention.